

APPLICANT(S): SHAHAR, Arie et al.  
SERIAL NO.: 10/813,108  
FILED: March 31, 2004  
ASSIGNEE: Prima Luci Inc.  
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### **Amendments to the Claims**

The following listing of claims replaces all prior versions and listings of claims in the application:

#### **Listing of Claims**

1.- 5. (Cancelled)

6. (Currently Amended) An optical AND logic gate comprising:

- i) a combining device having first and second inputs and a first output, ~~said one of said first and second inputs~~ including ~~includes~~ an optical delay line;
- ii) a splitting device having first second third and fourth terminals;  
and
- iii) a nonlinear element;
- iv) said third and fourth terminals form an optical loop including said nonlinear element displaced from the center of said optical loop;
- v) said first and second inputs arranged to receive first and second optical signals for producing a third optical signal at said first output of said combining device;
- vi) the first terminal of said splitting device arranged to receive said third optical signal from said first output of said combining device for producing at said second terminal a signal corresponding to the AND product of said first and second optical signals.

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7. (Original) The optical logic gate of claim 6 wherein said nonlinear element is a semiconductor amplifier (SOA).
8. (Original) The optical logic gate of claim 6 wherein said optical logic gate is fabricated on a chip.
9. (Currently Amended) An optical AND logic gate comprising:
  - i) a combining device having first and second inputs and a first output, ~~said one of said first and second inputs including includes~~ an optical delay line and said first output ~~including includes~~ a directing device for directing optical signal returning to said first output into a second output;
  - ii) a splitting device having first second and third terminals; and
  - iii) a nonlinear element;
  - iv) said second and third terminals form an optical loop including said nonlinear element displaced from the center of said optical loop;
  - v) said first and second inputs arranged to receive first and second optical signals for producing a third optical signal at said first output of said combining device;
  - vi) the first terminal of said splitting device arranged to receive said third optical signal from said first output of said combining device for producing at said second output a signal corresponding to the AND product of said first and second optical signals.
10. (Original) The optical logic gate of claim 9 wherein said nonlinear element is a semiconductor optical amplifier (SOA).

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11. (Original) The optical logic gate of claim 9 wherein said optical logic gate is fabricated on a chip.
12. (Original) The optical logic gate of claim 9 wherein said directing device is selected from a group of directing devices including optical couplers and optical circulators.
13. (Original) The optical logic gate of claim 9 wherein said one of said first and second inputs further includes an optical amplifier.
14. (Currently Amended) An optical AND logic gate comprising:
  - i) a combining device having first and second inputs and a first output, ~~said one of said first and second inputs~~ including ~~includes~~ an optical delay line and said first output including ~~includes~~ a directing device for directing optical signal returning to said first output into a second output;
  - ii) a splitting device having first second and third terminals;
  - iii) a nonlinear element; and
  - iv) an attenuator;
  - v) said second and third terminals form an optical loop including said attenuator and said nonlinear element displaced from the center of said optical loop;
  - vi) said first and second inputs arranged to receive first and second optical signals for producing a third optical signal at said first output of said combining device;
  - vii) the first terminal of said splitting device arranged to receive said third optical signal from said first output of said combining device

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for producing at said second output a signal corresponding to the  
AND product of said first and second optical signals.

15. (Original) The optical logic gate of claim 14 wherein said nonlinear element is a semiconductor optical amplifier (SOA).
16. (Original) The optical logic gate of claim 14 wherein said optical logic gate is fabricated on a chip.
17. (Original) The optical logic gate of claim 14 wherein said directing device is selected from a group of directing devices including optical couplers and optical circulators.
18. (Original) The optical logic gate of claim 14 wherein said attenuator is a semiconductor optical amplifier (SOA).
- 19.-24. (Cancelled)